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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,113	01/21/2004	Andrew B. McNeill JR.	RPS920030182US1	3914

47052	7590	01/17/2006

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EXAMINER
SUN, SCOTT C

ART UNIT	PAPER NUMBER
2182	

DATE MAILED: 01/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/762,113	MCNEILL ET AL.
	Examiner	Art Unit	
	Scott Sun	2182	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>21 January 2004</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-16, 19, 20</u> is/are rejected.

7)☒ Claim(s) <u>17,18</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>21 January 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>1/21/04</u>.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____ .

DETAILED ACTION

Specification

1.   The specification is objected to by the examiner because it does not clearly

describe the functionalities of the invention. In particular, applicant's disclosure

describes the use of desktop class disks as enterprise class disks (page 3, lines 14-15)

by limiting performance of desktop class disk drives to avoid exceeding duty cycle rating

of the disk drives (page 3, lines 16-18). According to the applicant's detailed

description, the disclosed invention causes desktop disk drives to operate at or below

their intended duty cycle rate by delaying subsequent commands to the disk drive

whenever the duty cycle rate is exceeded (figures 2, 3; page 6, lines 10-16). However,

the examiner asserts that if these desktop class disk drives (approximately 30% duty

cycle; page 2, line 12) are used as enterprise class disk drives (70-80% duty cycle;

page 2, line 5) as stated by the applicant, the drives would cause a backlog of

commands due to the delay mechanism disclosed by the applicant. Using the

examples given by the applicant, if an enterprise class storage system that normally has

duty cycle of 70% uses applicant's disclosed invention, limiting duty cycle to 30%, then

40% of the workload would be delayed and accumulate into a backlog. Although short-

term delays in the millisecond range are generally acceptable as they are unnoticeable

to the user, continual usage of the system appear to cause increasing larger delays.

For example, if the above system is used over a relatively long period of time of 10

hours, during which a 70% duty cycle is required but only 30% is performed by the

system, then roughly 4 hours of work (40% of 10 hours) would accumulate as backlog.

This would mean a new command requiring access to the storage system would have

to wait 4 hours before the command can be processed. One of ordinary skill in the art

at the time of invention would recognize that the **delay would render the system**

impractical for enterprise class usage, as intended by the applicant. The examiner

recognizes that these duty rates are hypothetical, and that actual usage might or might

not have the above problem depending on whether long-term duty cycle is above the

limit set by the system. Based on this reasoning, the examiner raises the following two

questions which the specification does not clearly present resolutions for:

> a.   If the system is used in an enterprise storage application in which the duty
>
> cycle required in the long term is above the duty cycle limit set by the system,
>
> then how does the system account for the increasingly larger backlog and
>
> corresponding delay?
>
> b.   If the system is used in an enterprise storage application in which the duty
>
> cycle required in the long term is equal or below the duty cycle limit set by the
>
> system, then how does the invention increase reliability and quality of the storage
>
> system if the problem of exceeding the duty cycle that the system is designed to
>
> solve does not exist?

The applicant is requested provide answers to the above two issues in order to present

a clearer description of the invention. The applicant is also reminded that no new

matter should be entered in response to this objection.

Claim Rejections - 35 USC § 101

2.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3.   Claims 1-9, 19, 20 are rejected under 35 U.S.C 101 because they describe a method that is not limited to tangible embodiments. Specifically, the claims recite the steps of "monitoring" and "limiting" which lacks practical application because they can easily be construed as an abstract idea as well as having no concrete or useful application/result. Applicant may intend the functions to be performed by hardware, but lack of such recitations would not limit the claims to tangible embodiments. Appropriate correction is required.

4.   To expedite a complete examination of the instant application, the claims rejected under 35 USC 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6.   Claims 1, 2, 10, 11, 19 are rejected under 35 U.S.C. 102(b) as being anticipated

by Bajorak et al. (US Patent #5,544,138).

7.   Regarding claim 1, Bajorak discloses a method (figure 13) comprising:

monitoring a number of idle states and busy states in a disk drive (step 120); and

limiting performance of read/write commands by the disk drive (power down, column 10,

lines 33-35) based on whether a sufficient number of idle states has been monitored

(column 10, lines 14-21, 24-28) to avoid exceeding a duty cycle rating of the disk drive

(column 1, lines 24-29). The examiner asserts Bajorak teaches "limiting the

performance of read/write commands by the disk drive" because a powered down drive

responds slower to read/write commands. The examiner also asserts that Bajorak

teaches "based on whether a sufficient number of idle states has been monitored"

because each idle state causes an adjustment to a register value which is compared to

a threshold in determining whether the disk drive should be powered down. The

examiner further asserts that Bajorak teaches "avoiding exceeding a duty cycle rating of

the disk drive" because Bajorak states explicitly reducing power also reduces the duty

cycle of the disk drive.

8.   Regarding claim 2, Bajorak discloses the method of claim 1 wherein the step of

monitoring further comprises utilizing a time count (register E) to track the number of

idle states and busy states in a disk drive (116, 142). The examiner notes that Bajorak

teaches the register value E is adjusted according to whether an operation (non-idle

state) is observed, which is essentially tracking the number of idle and busy states.

9.   Regarding claims 10, 11 and 19, the examiner finds these claims substantially

similar to claims 1 and 2, therefore the same arguments are used. Specifically, claims

1, 10 and 19 are similar; claims 2 and 11 are similar.

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

11.   Claims 3, 4, 6, 7, 12, 13, 15, 16 are rejected under 35 U.S.C. 103(a) as being

obvious over Bajorak.

12.   Regarding claim 3, Bajorak discloses claim 2 but does not disclose expressly

incrementing the time count by a first value for each idle state. However, Bajorak

discloses decrementing the time count by a first value (figure 13, decrementing E by BI1

in step 116) for each idle state. The examiner asserts that incrementing the time count

is a design choice that is obvious over Bajorak because counting up to a threshold is

equivalent to counting down to a mirror threshold as both accomplish the same result.

For example, counting up to a threshold T in step sizes of X is equivalent to counting

down to −T in step sizes of X.

13.   Regarding claim 4, Bajorak discloses claim 3, but does not disclose expressly

decrementing the time count by a second value for each busy state. However, Bajorak

discloses incrementing the time count by a second value (incrementing E by Eopj in

step 142) for each busy state. The examiner makes the same argument as above in asserting that counting up to a threshold is equivalent to counting down to a mirror threshold. The examiner further asserts then when different step sizes for incrementing and decrementing are used, the reversed counting cited above is still equivalent. For example, suppose a system has a threshold T, with step sizes X1 for incrementing (towards T if T is positive) and X2 for decrementing (away from T). This is equivalent to a system with a threshold of −T, with step sizes of X1 for decrementing (towards −T) and X2 for incrementing (away from −T).

14.   Regarding claim 6, Bajorak discloses claim 2 but does not disclose expressly determining whether the time count has an accumulated value that is greater than zero. However, Bajorak discloses determining whether register value E (associated with time count) has an accumulated value that is greater than Et1 (step 122). The examiner asserts that the values zero and Et1 are design choices that are equivalent and obvious variations of each other. One of ordinary skill in the art at the time of invention would easily convert a system with a non-zero threshold to a system with zero being the threshold by subtracting the non-zero threshold from the initial start value. For example, a system with a threshold of N (N does not equal zero) can be converted to a system with a threshold of zero simply by subtracting the starting value by N. So Bajorak's system can be easily converted into a functionally equivalent system in which the threshold is zero by subtracting the initial value by the original threshold of Et1.

15.   Regarding claim 7, taking into consideration the previous arguments made for incrementing, decrementing, and having a threshold of zero, examiner asserts that the

system disclosed by Bajorak would be in active mode if E is greater that the threshold, which stated above can be easily adjusted to zero, therefore read/write command would be performed.

16.   Regarding claims 12, 13, 15, and 16, the examiner finds these claims substantially similar to claims 3, 4, and 6. Therefore the same arguments are applied.

17.   Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being obvious over Bajorak in view of Hetzler (US Patent # 5,682,273).

18.   Regarding claim 5 and 14, Bajorak discloses claims 4 and 13 but does not disclose expressly first and second values are selected according to a target duty cycle for the disk drive. However, Hetzler discloses selecting a first value (time window) and a second value (number of accesses) to provide a ratio according to a target duty cycle ratio (access frequency) for a disk drive (step 305, figure 4; column 7, lines 26-29; column 8, lines 27-40). Teachings of Bajorak and Hetzler are from similar field of disk drives, and specifically in power conservation.

19.   Therefore it would have been obvious at the time of invention to combine Bajorak's teachings and Hetzler's teachings by using the frequency computing technique disclosed by Hetzler to control the mode switching of the disk drive system disclosed by Bajorak for the benefit of adjusting mode of the disk drive system according to user demands (column 2, lines 15-23).

20.   Claims 8, 9, 17, 18, and 20 are objected to because of their dependency on the above rejected claims.

Conclusion

21.   Other publications are cited to further show the state of the art with respect to

duty cycle control in disk drives. Refer to form 892, "Notice of References Cited", for a

complete list of relevant prior arts cited by the examiner.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Scott Sun whose telephone number is (571) 272-2675.

The examiner can normally be reached on M-F, 10:30am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Kim N. Huynh can be reached on (571) 272-4147. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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SS

12/29/2005

KIM HUYNH

SUPERVISORY PATENT EXAMINER

1/9/06